MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. XXIV. *Feb.* 12, 1864. No. 4.

THE Annual General Meeting of the Society, Rev. R. MAIN, Vice-President, in the Chair.

G. F. Chambers, Esq., 2 Palace Gardens, Kensington;
J. B. N. Hennessey, Esq., Indian Trigonometrical Survey;
R. Webster, Esq., 74 Cornhill;
Alfred Cooper, Esq., Training College, Highbury;
Henry Roe, Esq., Training College, Highbury; and
Capt. J. Higgens, 38 Harpur Street, Bedford,

were balloted for and duly elected Fellows of the Society.

Report of the Council to the Forty-fourth Annual General Meeting of the Society.

In former years the Financial and Statistical Statements were brought up to Feb. 8 in each year: then, when the interval between that day and the day fixed for the Anniversary Meeting was found to be inconveniently short, a mixed system was fallen into of closing the Financial Account at Dec. 31 preceding, and the Statistical Statement on Feb. 8. Inconveniences having thereby arisen, the Council have resolved for the present and future years to present both statements made up to Dec. 31 of the year preceding; and taking into account the expansion of the Society's affairs since its practice in these respects was last considered, the Council have further resolved to present the accounts of the year by Balance-Sheet and Profit-and-Loss Account, in place of the former Cash Account of the Treasurer, which has been audited as usual. On this occasion a Balance-Sheet is given for the commencement as well as for the end of the year.

Progress and present state of the Society:—

	Compounders.	Annual Contributors.	Non-residents.	Patroness, and Honorary.	Total Fellows.	Associates.	Grand Total.
February 8, 1863...	163	245	31	5	444	47	491
Since elected	4	9	...	...	...	4	...
Deceased	−4	−3	−8	−1	...	−4	...
Removals	1	−2	1	...	...	...	...
Resigned	...	−5	...	...	...	...	...
Replaced	...	...	...	1	...	...	...
Dec. 31, 1863	164	244	24	5	437	47	484

BALANCE SHEET, December 31, 1862.

Dr. £	s.	d.		Cr. £	s.	d.
–	–	–	Cash in hand.			
240	8	8	Banker's balance.			
			Proceeds of Turnor fund	69	16	10
			Proceeds of Lee fund	11	9	3
			Due to Mrs. Jackson	–	–	–
390	14	0	Annual contributions—arrears.			
			,, paid in advance	6	6	0
2	2	0	Admission fee—1 due			
2	1	8	Due for publications.			
			Reserve against sums due	40	0	0
2100	0	0	3 per Cent Consols at par.			
			,, Turnor fund	500	0	0
			,, Lee fund	110	0	0
3900	0	0	New 3 per Cents at par.			
			,, Jackson fund	300	0	0
			Sundry debts unpaid	44	0	0
31	10	0	3 medals in stock.			
–	–	–	Unsold publications.			
–	–	–	Books and instruments.			
			Composition fund ... £3381 0 0			
			Net capital 2204 4 3	5585	4	3
6666	16	4		6666	16	4

PROFIT AND LOSS ACCOUNT.

Cr.

	£	s.	d.	£	s.	d.
By New compositions	...	...		147	0	0
Compositions set free	...	...		84	0	0
Admission fees	...	...		35	14	0
First year's contributions	...	...		22	1	0
Annual contributions	...	...		501	18	0
Dividends, January	30	6	5			
,, April	56	6	2			
,, July	30	11	8			
,, October	58	5	0	175	9	3
Sale of publications	...	...		73	6	2
By Investing under par	...	...		26	3	2
				1065	11	7

Dr.

	£	s.	d.	£	s.	d.
To Composition fund	...	...		147	0	0
Turnor fund	15	0	0			
Lee fund	3	5	6			
Mrs. Jackson	8	13	4	26	18	10
Rent	...	...		–	–	–
Editor	60	0	0			
Printing	257	18	6			
Engraving and lithographing ...	62	3	9			
Binding	7	4	9			
Assistant-Secretary	100	0	0			
Collection	31	14	0	519	1	0
Taxes	6	3	5			
Postage	33	2	0			
Parcels	5	1	7			
House Expenses	24	10	0			
Coals and gas	17	7	6			
Meetings	17	10	0			
Insurance	12	5	6			
Repairs	5	8	6			
Medal (none awarded)	–	–	–			
Sundries	19	0	3	140	8	9
Sums written off	14	14	0			
Reserve fund	25	0	0			
To Capital—increase	192	9	0	232	3	0
				£1065	11	7

BALANCE SHEET, DECEMBER 31, 1863.

Dr. £	s.	d.			Cr. £	s.	d.
–	–	–	Cash in hand.				
353	4	1	Banker's balance.				
			Proceeds of Turnor fund	... ...	82	2	10
			Proceeds of Lee fund	... ...	14	14	9
			Due to Mrs. Jackson	... ...	–	–	–
376	0	0	Annual contributions—arrears.				
			,,	paid in advance	4	4	0
3	0	8	Due for publications.				
			Reserve against sums due	... ...	65	0	0
2100	0	0	3 per Cent Consols at par.				
			,,	Turnor fund	500	0	0
			,,	Lee fund	110	0	0
4218	5	8	New 3 per Cents at par.				
			,,	Jackson fund ...	300	0	0
			Sundry debts unpaid	... ...	165	5	7
31	10	0	3 medals in stock.				
–	–	–	Unsold publications.				
–	–	–	Books and instruments.				
			Composition fund	... £3444 0 0			
			Net capital	... ... 2396 13 3	5840	13	3
7082	0	5			£7082	0	5

Stock of volumes of the *Memoirs*:—

Vol.	Total.	Vol.	Total.	Vol.	Total.
I. Part 1	20	X.	191	XXI. Part 2 (separate).	100
I. Part 2	62	XI.	201	XXI. (together).	107
II. Part 1	79	XII.	207		
II. Part 2	43	XIII.	221	XXII.	199
III. Part 1	96	XIV.	408	XXIII.	201
III. Part 2	116	XV.	190	XXIV.	202
IV. Part 1	117	XVI.	213	XXV.	216
IV. Part 2	129	XVII.	191	XXVI.	225
V.	143	XVIII.	191	XXVII.	485
VI.	164	XIX.	205	XXVIII.	442
VII.	188	XX.	198	XXIX.	472
VIII.	174	XXI. Part 1 (separate).	316	XXX.	239
IX.	178			XXXI.	255

The instruments belonging to the Society are as follows:—

The *Harrison* clock,
The *Owen* portable circle,
The *Beaufoy* circle,
The *Beaufoy* transit,
The *Herschelian* 7-foot telescope,
The *Greig* universal instrument,
The *Smeaton* equatoreal,
The *Cavendish* apparatus,
The 7-foot Gregorian telescope (late Mr. Shearman's),
The Variation transit (late Mr. Shearman's),
The Universal quadrant by Abraham Sharp,
The *Fuller* theodolite,
The Standard scale,
The *Beaufoy* clock,
The *Wollaston* telescope,
The *Lee* circle,
The *Sharpe* reflecting circle.

The *Sheepshanks*' collection of instruments, viz.,—

1. 30-inch transit, by Simms, with level and two iron stands.

2. 6-inch transit theodolite, with circles divided on silver; reading microscopes, both for altitude and azimuth; cross and siding levels; magnetic needle; plumbline; portable clamping foot and tripod stand.

3. $4\frac{6}{10}$ achromatic telescope, about 5 feet 6 inches focal length; finder, rack motion; double-image micrometer; object-glass micrometer; two other micrometers; one terrestrial and ten astronomical eyepieces, applied by means of two adapters.

4. $3\frac{1}{4}$-inch achromatic telescope, with equatoreal stand; double-image micrometer; one terrestrial and three astronomical eyepieces.

5. $2\frac{3}{4}$-inch achromatic telescope, with stand; one terrestrial and three astronomical eyepieces.

6. $2\frac{3}{4}$ achromatic telescope, about 30 inches focus; one terrestrial and four astronomical eyepieces.

7. 2-foot navy telescope.

8. 45-inch transit instrument, with iron stand, and also Y's for fixing to stone piers; two axis levels.

9. Repeating theodolite, by Ertel, with folding tripod stand.

10. 8-inch pillar-sextant, divided on platinum, with counterpoise stand and horizon roof.

11. Portable zenith instrument, with detached micrometer and eyepiece.

12. 18-inch Borda's repeating circle, by Troughton.

13. 8-inch vertical repeating circle, with diagonal telescope, by Troughton and Simms.

14. A set of surveying instruments, consisting of a 12-inch theodolite for horizontal angles only, with extra pair of parallel plates; tripod staff; in which the telescope tube is packed, repeating table; level collimator, with micrometer eyepiece; and Troughton's levelling staff.

15. Level collimator, plain diaphragm.

16. 10-inch reflecting circle, by Troughton, with counterpoise stand; artificial horizon, with metallic roof; two tripod stands, one with table for artificial horizon.

17. Hassler's reflecting circle, by Troughton, with counterpoise stand.

18. 6-inch reflecting circle, by Troughton, with two counterpoise stands, one with artificial horizon.

19. 5-inch reflecting circle, by Lenoir.

20. Reflecting circle, by Jecker, of Paris.

21. Box sextant and 3-inch plane artificial horizon.

22. Prismatic compass.

23. Mountain barometer.

24. Prismatic compass.

25. 5-inch compass.

26. Dipping needle.

27. Intensity needle.

28. Ditto ditto.

29. Box of magnetic apparatus.

30. Hassler's reflecting circle, with artificial horizon roof.

31. Box sextant and $2\frac{1}{4}$-inch glass plane artificial horizon.

32. Plane speculum artificial horizon and stand.

33. $2\frac{1}{2}$-inch circular level horizon, by Dollond.

34. Artificial horizon roof and trough.

35. Set of drawing instruments, consisting of 6-inch circular protractor; common ditto; 2-foot plotting scale; two beam compasses and small T square.

36. A pentagraph.

37. A noddy.

38. A small Galilean telescope, with the object lens of rock-crystal.

39. Six levels, various.

40. 18-inch celestial globe.

41. Varley stand for telescope.

42. Thermometer.

43. Telescope, with the object-glass of rock crystal.

These are now in the apartments of the Society, with the exception of the following, which are lent, during the pleasure of the Council, to the several parties under mentioned, viz.:—

The *Lee* circle, to Mr. Burr.
The *Beaufoy* clock, to Dr. Booth.
The *Beaufoy* transit, to the Observatory, Kingston, Canada.

The *Sheepshanks* instrument, No. 1, to Mr. Lassell.
Ditto ditto No. 2, to Mr. De La Rue.
Ditto ditto No. 3, to Rev. C. Pritchard.
Ditto ditto No. 4, to Rev. F. Howlett.
Ditto ditto No. 5, to Mr. Birt.
Ditto ditto No. 6, to Rev. J. Cape.
Ditto ditto No. 9, to Mr. Lockyer.
Ditto ditto No. 19, to Mr. Dayman.
Ditto ditto No. 25, to Mr. Dayman.
Ditto ditto No. 41, to Rev. C. Pritchard.
Ditto ditto No. 43, to Mr. Huggins.
The 6-inch circular protractor, to Mr. Birt.

The *Beaufoy* clock, lent to the Royal Society on July 12, 1839, has at length been traced and returned to the Society.

The Volume of Memoirs.

The principal topics discussed in Vol. XXXII. of the *Memoirs* are embodied in the account given of the progress of Astronomy during the past year; it is, therefore, unnecessary here to open any formal remarks on their several contents. Nevertheless, the Council will be justified in tendering the thanks of the Society at large to the Astronomer Royal, for his kindness in procuring from the Admiralty the gratuitous insertion of his interesting Memoir on the Determination of the Longitude of Valencia. The readers of this paper cannot fail to be struck with the almost unexpected exactness of the coincidence of the longitude, as obtained by the transmission of chronometers with the value of the same element, as obtained by means of a long electric wire. It is curious to observe herein, how, as in a thousand other instances, no sooner is one method of operation brought to perfection, than it is doomed to be supplanted by some other process of readier or more accurate application.

The readers of the volume will also be gratified with the careful delineation of the features of *Mars*, as seen telescopically at his last opposition by Lord Rosse, Mr. Lassell, and especially by Mr. Lockyer. In due time these pictures cannot fail to assist in the elimination of the appearances due to the planet's atmosphere from those which belong to the physical conformation of the surface. Mr. Main's measures of the ellipticity and dimensions of the same planet, independently of their intrinsic value, are an evidence that he will not permit the Oxford heliometer to remain idle under his keeping.

Obituary.

The Society has to regret the loss by death of the following Fellows and Associates:—

Honorary.—Baron von Senftenberg.

Fellows.—Rev. J. E. Ashby.
Beriah Botfield, Esq.
Josh. Gwilt, Esq.
T. C. Janson, Esq.
J. Jesse, Esq.
Commander M. Montagu.
Admiral Washington.
Rev. Thos. Belgrave, *Non-Resident.*
Rev. Jas. Grooby. „
Dr. Haldane. „
Jno. Fardell, Esq. „
Jas. Jardine, Esq. „
Commander Molesworth. „
Josh. Moore, Esq. „
Rev. W. Potchet. „

Associates.—Prof. Amici.
M. Capocci.
M. Mosotti.
M. le Baron Plana.
M. Weisse.

The King of Siam, an Honorary Member, reported as dead, is still alive.

John Eyre Ashby was born on the 22d January, 1820. He was educated at University College School, London, where he obtained several distinctions, and in 1840 graduated B.A. in the University of London. After several years in Homerton College, devoted more especially to his training for the work of a Congregational Minister, he laboured both as a Pastor and as a Lecturer on the higher Mathematics, successively in Arundel, Brighton, and London. In 1856 he established a boys' school at Enfield, and carried it on with success till his premature death on December 22d, 1863. In 1858 he proceeded with distinction to the degree of LL.D. in the University of Jena. He was elected a Fellow of the Royal Astronomical Society in 1843.

Of Dr. Ashby's kindness and courteousness,—of his genuine wit and sense of humour,—of his industry and energy,—of the liberality of his religious convictions,—of the wide range of his acquirements, and the strong grasp of his mind,—many men in the extensive circle of his acquaintance and friends can testify. Taken so early from the sphere of his activities here,

before a time of leisure had arrived, Dr. Ashby had not completed much original work. His early devotion to Mathematics and Astronomy gave way to an increasing fondness for Chemistry and Chemical Physics. On these and kindred subjects he gave interesting and well-illustrated lectures, not only to his own school, but to various public institutions.

Beriah Botfield was born in the year 1807. He was educated at Harrow, the school of which he subsequently endowed with the "Botfield Medal for Modern Languages." From Harrow he proceeded to Christ Church, Oxford, and took his degree of B.A. in 1828.

Mr. Botfield was principally distinguished as a bibliographer, in which pursuit he was almost unrivalled. He published several works on bibliographical and antiquarian subjects, and communicated numerous papers on similar subjects to the *Gentleman's Magazine* and other periodicals. In 1840 he was returned to Parliament for Ludlow, and although at a subsequent election in 1847 he was unsuccessful, he regained his seat in 1857, and sat for that borough from that time to the close of his life.

His library at Norton Hall, Northamptonshire, is chiefly remarkable for a fine collection of *editiones principes* of classical authors, and costly folio editions of illustrated works.

He was a Fellow of the Royal Society, and of the Society of Antiquaries, and joined this Society in 1839. He died on the 7th of August, 1863, at the age of 56 years.

Joseph Gwilt was born in the parish of St. George the Martyr, Southwark, January 11, 1784. He was the son of Mr. George Gwilt, architect, which profession he also followed, and at his decease was looked upon as one of its most eminent members. He was the author of many valuable works, chiefly relating to architectural literature. The chief of these is his *Architectural Dictionary*, which is a production of extraordinary merit, whether for the purposes of elementary and advanced study, or for those of general reference. It has gone through many editions, and is much valued by the profession. In 1815 he became a Fellow of the Society of Antiquaries, and in 1833 was elected a Fellow of this Society. He died on the 14th of September, 1863, in his eightieth year.

Thomas Corbyn Janson was born on the 1st of July, 1809. He was educated by Dr. Morell, of Hove, near Brighton, and acquired great proficiency in the learned languages. In his early youth he was much distinguished for his taste for natural history, which continued his favourite pursuit during his life. He also paid considerable attention to astronomy, and was a careful and laborious observer of transits, occultations, and eclipses. In 1860, while travelling in the south of France, he

crossed the Spanish frontier in order to observe the Total Eclipse of the Sun which occurred in that year. The place he selected was Burgos, where he had an unclouded view of the eclipse. The observations he made on that occasion appeared in one of the periodicals of the day, and also formed the subject of a paper read to this Society. He was for many years a Fellow of the Linnean Society, where he was much respected as a sound and well-informed naturalist. He joined this Society in 1848, and frequently attended the meetings, but, with the exception of the paper relating to the Eclipse, never communicated any results of his astronomical observations. He died June 23, 1863, in the fifty-fourth year of his age. In his will he left the sum of two hundred pounds, free of legacy duty, payable after the decease of his widow, to be added to the fund in connexion with the Royal Astronomical Society, called "The Lee Fund."

Admiral WASHINGTON was born on the first day of the present century. He entered the Navy on May 15th, 1812, as a first-class volunteer on board the "Junon," 46 guns, Captain James Sanders, fitting for the North American station, where he took part in many operations in the River Chesapeake. He assisted in making prizes of several of the enemy's vessels, and contributed to the complete discomfiture of fifteen gun-boats that had been despatched for the express purpose of capturing the "Junon," after an action of three hours, fought on June 20, 1813. Removing as midshipman in the following October to the "Sybille," he sailed in that ship in 1814, under Captain Forrest, with the "Princess Caroline," Captain Downman, for the latitude of Greenland, in fruitless pursuit of the American Commodore Rogers. In November of the same year, having returned to England, he entered the Royal Naval College at Portsmouth, and this unquestionably was the turning-point in his career. Naturally of studious habits, he turned to the greatest advantage the opportunity afforded him of improving his education; and the mental training he thus received enabled him in subsequent years to improve the talents he possessed, not in the accumulation of wealth, but in advancing the interests of his profession, and in helping forward the cause of humanity. On leaving the Royal Naval College, he was received in May, 1816, on board the "Forth," Captain Sir Thomas Louis, under whom he was again employed for upwards of three years on the coast of North America. He then in succession joined the "Vengeur" and the "Superbe," both on the South American Station, where he remained until after his promotion to the rank of Lieutenant, which took place on the 1st January, 1821. He was subsequently employed on particular service, and in August, 1830, was appointed to the "Royal George," 120, as Flag-lieutenant to Admiral St. John Poer Beresford, Bart., Com-

mander-in-Chief at the Nore — continuing to serve under that officer, in the "Ocean," until advanced to the rank of Commander in 1833.

To the active service consequent upon his various appointments he had united the practice of maritime surveying, and the combined pursuits of a scientific hydrographer and geographer. In 1835 he succeeded Captain Maconochie as Secretary of the Royal Geographical Society of London, but resigned that office in 1841, on being appointed to continue the survey of the North Sea, which had for some time been in progress. During this undertaking, in which he was continually engaged until the close of 1844, he was necessarily occupied in correcting the existing charts, as the positions of the shoals and the directions of the navigable channels had in many cases become changed. This service was strikingly useful, and led in a great degree to his subsequent appointment as a Royal Commissioner on certain important questions respecting the construction of harbours of refuge on exposed coasts of the country.

In 1842 he was appointed to the rank of Post-Captain, in compliment to the King of Prussia. This survey was Captain Washington's last service afloat. In 1845 he was appointed a member of a Royal Commission for inquiring into the state of the rivers, shores, and harbours of the United Kingdom, the duties of which office brought him into contact with a large number of our seamen and fishermen, in whose welfare he took unceasing interest from this period until the day of his death.

He was subsequently engaged in an inquiry into the condition of our large fisheries on the north-east coast of Scotland. His able Report, and the clear plans of the different classes of fishing-boats which accompanied it, prepared expressly by Mr. James Peake, Master Shipwright of Her Majesty's Dockyard, Devonport, deservedly attracted considerable attention.

"When we remember," said the late Admiral, "that the fishing-boats of the United Kingdom number probably 36,000, manned by 150,000 men and boys, it will be admitted that this class of men deserves some consideration, and that, as far as may be, their small harbours should be deepened, to enable them to obtain shelter in time of need, and at all states of the tide."

In 1853 Captain Washington visited some of the Russian fortresses in the Baltic. In the following year the war broke out, and the results of his acute observations during that tour proved of the greatest value. He was thus enabled to give most important information regarding the character of those fortresses, which could not possibly be obtained from any other recent and reliable source. His experience was afterwards turned to good account by the assistance he continued to render, during the whole period the war lasted, to the Admiralty.

In the year 1855 he was appointed by Sir James Graham, Bart., M.P., then first Lord of the Admiralty, to the responsible office of Hydrographer of the Admiralty on the retirement and special recommendation of the late Admiral Sir Francis Beaufort, F.R.S., to whom he was much attached. With reference to this appointment, Sir James stated, in the House of Commons, at the close of the Russian war in 1856, that during his long official life no appointment made by him had afforded him more satisfaction than that of Admiral Washington. To the responsible duties of that office he devoted himself with such assiduity, that his valuable life was unquestionably brought to a premature end by over-mental exertion in connexion with it.

"When first appointed to the surveying service," writes a gentleman who had served under Admiral Washington in that department, "no officer could have carried on the duties with more zeal, activity, and intelligence. His zeal and abilities were conspicuously shown forth by the mass of information he published to the world during the few years he was at the head of the Hydrographic Office, in Charts, Sailing-directions, Tide-tables, &c. Indeed, he had not held that appointment above three or four years before he had arranged for publication the results of numerous nautical surveys and other useful professional information which had accumulated in the office. His quickness and clearness of judgment in revising charts and other office works were conspicuous to every one, and the amount of work he undertook and accomplished showed his great application and abilities."

In 1858 Captain Washington again became a Member of the Royal Commission to inquire into the proper sites for Harbours of Refuge along the coasts of the United Kingdom. We are informed that the remarkable extent of his local knowledge of the districts visited by this Commission, and his active and painstaking habits, were of great value to the Commission; indeed, that it was looked upon by him as one of the crowning efforts of his labours in the cause of humanity, and on behalf of his humbler professional brethren.

Thus he continued to discharge, without intermission, the onerous duties of his office. Returning in the evening to his own home, these duties were occasionally pursued until the early hours of the morning. He was thoroughly devoted to his profession, and especially to all matters connected with hydrographic science; and no labour, no trial, was too great for him, so long as his public duties were satisfactorily discharged.

In the year 1862 Captain Washington was promoted to the rank of Rear-Admiral, and in the same year one of his last public labours was to act as a Juror at the International Exhibition of 1862. He was unanimously elected Chairman of the section which embraced those objects he had so long studied.

His funeral took place at the Protestant cemetery of St. Marie, Havre, on the 19th September, with every demonstration of respect on the part of the foreign authorities of the town. Admiral Washington's character was much valued in France; and in consequence, immediately his decease became known, the heads of departments at Havre—civil, naval, and military—expressed their desire to attend the funeral. Officers and men of the Imperial yacht "Prince Jerome," to the number of forty, formed part of the *cortège*. The English ships in the harbour hoisted their colours half-mast high, and the captains of two large steamers volunteering the attendance of six of their seamen as bearers, the offer was gratefully accepted by the family. The French authorities all attended in full uniform; and the inhabitants of Havre, thronging the streets, silently and reverently testified their respect and regret. The naval Aide-de-Camp to the English Embassy in Paris, and another English naval officer, were also present. The unexpected sympathy shown by the French in thus honouring the Admiral's memory was gratefully felt and acknowledged as a consolation by his afflicted family; and the Lords Commissioners of the Admiralty afterwards expressed officially to the authorities of Havre their deep sense of the honours so gracefully bestowed.

Thus closed the life of one of the most valuable officers in Her Majesty's Service. That his years should have been cut in the midst of an active professional life must be to Admiral Washington's friends an occasion of regret; but they may, however, feel grateful that so much has been accomplished by him.

Jean Baptiste Amici was born on March 23, 1786, at Modena, where he studied the higher branches of mathematics under Ruffini, and while yet extremely young was appointed Professor in the University of his native town. In 1831 he was invited to Florence, and nominated to the direction of the Observatory of that city, as successor to the celebrated astronomer Pons. Amici remained at Florence until the day of his sudden death, on April 10th, 1863.

Amici was the inventor and constructor of many ingenious contrivances in connexion with both the microscope and the telescope. His pretty adaptation of four plane prisms to the formation of an achromatic telescope will always be read with pleasure, and associate his name among men famous for optical skill.

At a time when an effective achromatic objective was beyond the reach of hope for the microscope, Amici invented and brought to perfection a reflecting instrument, which is in itself no mean rival of that noble form to which opticians have at length brought the microscopic object-glass in our own days. It is said that some of Amici's microscopes possessed a

magnifying power of one thousand linear, with sufficient light and distinct definition. In more recent times Amici devoted much attention to the construction of achromatic objectives for the microscope, and in that particular form, when much loss of light by reflection is obviated by the immersion of the posterior lens in a fluid, he was probably equal to the best of our justly celebrated English constructors.

Amici, among other interesting novelties in optical instruments, devised a small and very portable level for agricultural purposes, adapted to a short telescope resembling an opera glass, but which nevertheless was provided with wires of reference. He overcame the apparently insuperable difficulty of the concave eye-glass, by grinding the edge of that lens into a convex form, in the focus of which the wires of the telescope were placed, and to which the magnified image of exterior objects could thus be referred.

Amici made original observations of value in the circulation of the sap in *Chara Vulgaris*, and is said to be the discoverer of the pollen tubes in plants of the phanerogamic group.

On the 6th of January died Ernesto Capocci, Director of the Observatory of Capodimonte. This excellent man had been for some time suffering from an internal complaint, which in the last few months increased and brought on disease of the heart, which terminated his painful sufferings. He was born on the 28th March, 1798, at Picinisco, in the province Terra di Lavoro. He went, early in life, to reside with his maternal uncle, Zuccari, Director of the Observatory of S. Gaudioso, from whom he received his scientific training, while he was indebted to the Abbé (afterwards Cardinal) Capaccini for the literary culture manifested more especially in his later works. In them the clearness of scientific enunciation is always coupled with the charm of a poetical diction which rendered his writings peculiarly attractive. Quick at seizing a new discovery, he knew how to give it an interesting turn, and to describe it in clear and unmistakable language, which gained for him many readers.

In youth, Capocci's scientific activity was already developed; for in his eighteenth year he had published, in the *Giornale Enciclopedico di Napoli*, some astronomical observations: he was also a voluminous contributor to *Zach's Correspondence Astronomique;* and he was a diligent computer of the orbits of comets, following up closely with calculations the tracks of these erratic bodies.

With a critical eye he watched the spots of our luminary, and his observations concerning them are lucid and important. His treatment of the Hora 18 of the Berlin Star Maps, which was one of the most difficult on account of the number of stars, obtained for him well-deserved commendation. His *Dialoghi*

sulle Comete, to which the five comets of 1828 gave rise, afford an example of classical style, and answer in a lucid manner the various questions which the fresh appearance of a comet gives rise to.

He became Director of the Observatory of Capodimonte in 1838. During the years 1836 to 1858 he travelled in France, England, and Belgium. He sat in Parliament under Ferdinand II., but had to resign his office of Director of the Observatory on the breaking up of the Constitution; and it was not until 1860 that he was again installed in it. During the period of his privation and trial he wrote, in a colloquial form, his commentary relating to the cosmography of Dante's *Divina Commedia;* and it would be difficult to point out any one better fitted for such a work than Capocci, who combined with high scientific knowledge rare literary talent.

On the consolidation of the present kingdom of Italy, Capocci was appointed Senator, and was created Commander of the Order of St. Maurice and Lazarus.

Honourable in the highest degree, Capocci was remarkable for the unassuming simplicity of his manners, his amiability and kindliness. Always modest, he was lively in conversation, and had the faculty of drawing towards him all who knew him. The goodness of his heart was always pourtrayed in his intelligent features, and even death did not efface their sweet expression.

Ottaviano Fabrizio Mosotti was born at Novara on the 18th of April, 1791. He studied with great ardour and success in the College of Monza, and in 1811 he gained the laurel prize for Mathematics in the University of Pavia, where Brunacci said of him, "For two years he was our scholar, but we cannot deny he has become our master." At Pavia he remained until 1813, hoping to obtain a chair in one of the Italian universities, but failing in this wish he determined to study engineering; yet, in order to preserve his scientific acquirements, he attached himself to the Observatory at Milan, retaining his connexion there until 1823. In the interim Mosotti published several memoirs on various scientific subjects, and was in 1822 elected one of the forty members of the Italian Scientific Society.

From the known liberality of his political sentiments he soon fell under the suspicions of the Austrian Government, and was ultimately compelled, like many others, to seek for safety within the shores of England. Here he naturally became acquainted with many of the chief scientific men of the day, and was enrolled on the list of Foreign Associates of the Royal Astronomical Society.

In 1827 Mosotti was appointed, while in London, to the Mathematical Chair in the University of Buenos Ayres; owing

to political disturbances he never occupied it, but after some time was elected Chief Engineer and Assessor in the Topographical Office of that city, and afterwards to the Chair of Natural Philosophy. Here Mosotti gained universal esteem, and the good opinion of even the Dictator Rosas himself, and in after times he often referred to this portion of his life with peculiar pleasure.

But Mosotti's affections were far away, in his native country, and ever longing to return; in 1835 he embraced the honourable opportunity which was presented to him by Cardinal Oppizzoni, the legate of Bologna, of presiding over the University of that city. On his return to Italy, the Roman Government, acting, it is presumed, under the dictation of Austria, refused to confirm Mosotti in the appointment which he had accepted, the Papal authorities, after repeated expostulations, presenting him with 2500 scudi as some compensation for his loss.

In 1836 Mosotti gave to the world his treatise on molecular action, for which he is so justly celebrated, entitled, *On the Forces which regulate the Internal Constitution of Bodies.*

In 1837 Mosotti was appointed to the Professorship of Mathematics in the University of Corfu, and while there he succeeded, as was natural, in securing the esteem of many of the English residents. A mutual attachment here sprang up between himself and a young English lady, Miss Anna Suter; and in 1840, on his election to the Chair of Mathematical Physics in the University of Pisa, she became his wife. He was a loving and exemplary husband, until the death, at Pisa, in 1843, of at once his wife and her infant.

Mosotti was always a welcome and remarkable member of those meetings of learned men which kept alive the national spirit of Italy, and paved the way for the movements of 1848. During his professorship at Pavia Mosotti published many valuable papers on scientific subjects, but these pursuits could not make such a heart as his forgetful of his country. He sat in the Tuscan Senate, and in 1848 he commanded with signal bravery the University Brigade in the war with Austria. At Curtatone and Montanara a powerful Austrian force attacked the Tuscan camp. In the thick of the combat Mosotti remained unmoved, but the brigade under his command was soon surrounded by the Austrian artillery, and placed in the greatest peril. When entreated by his pupils to save his life, he replied, "Do you think I, who am your father, will abandon my sons in their peril?" At the end of the war the brigade which loved him so well dispersed, and Mosotti returned to his studies once more.

Mosotti was a Senator in the Italian Parliament at Turin, but the fatigue of the journey to and fro was too much for him, and he rarely sat in his place. So in the softer air of Pisa he

continued to study and write, until in 1863 he was attacked with rheumatic fever, and died on the 20th of March in that year.

Pisa, which had watched over him as over a favourite child, mourned him with deep and universal regret. All had known and loved the professor; and almost every household mourned, when, the day after his death, his body was borne to the Campo Santo, followed by the members of the University, the brigade that he had commanded in 1848, the National Guard, officials, civil and military, and an immense crowd of private persons, who wished to show their veneration for the great man who was dead.

Senator Baron Jean Batiste Plana was born in Voghera in November 1781.

He entered the École Polytechnique of Paris, classed eighth among 120 admitted under Professors Lagrange, La Place, and Legendre.

On leaving the Polytechnic School he was appointed professor in the Ecole Impérial d'Artillerie of Alexandria in Piedmont, and was sent there by Legendre with the following remark, "Vous êtes jeune, mais la jeunesse est un défaut dont on se corrige tous les jours."

From 1812 to 1853 Plana was Professor of the Higher Mathematics in the University of Turin, and was also Professor at the Military College. He was appointed Royal Astronomer to the Observatory of Turin, and held that office until his death. He was President of the Academy of Sciences in Turin, Membre Etranger de l'Institut de France, and member of most of the existing scientific societies.

Plana married Alexandra, daughter of the celebrated Lagrange. He had one son, who died in early life, and a daughter, Sophia, still living.

He died in Turin on January 20th, 1864, where he was buried with almost regal pomp.

Plana appears to have directed his attention for many years to the Theory of the Moon's movement; for, though his great work on that subject was not completed until 1832, yet so early as 1816 his friend the Baron de Zach wrote to him as follows:—"I am aware that you have undertaken, in concert with Signor Carlini, an important work on the Theory of the Moon. The existing theory has, in truth, much need of revision, and I have no doubt much good will result from your investigations."

Plana and Carlini were associated as astronomers in the measure of an arc of the Meridian in Savoy and Piedmont, entrusted to a mixed Commission, appointed by the Governments of Austria and of Piedmont, and performed during the years 1821, 1822, 1823.

This important operation was admirably conducted, and

the result published in two volumes; the Introduction to which was written by Plana, with the approval of Carlini. The astronomical labour and talent displayed in this work were so highly appreciated, that in 1828 the Institute of France adjudged the Lalande Prize to Plana and Carlini as authors of the most interesting observations and of the memoir most useful to the progress of astronomical science.

Plana was made a Baron by the King of Sardinia, and also named a Senator at the formation of that body in 1848.

Plana's first important work was his *Théorie Mathématique du Mouvement de la Lune*, and the latest, *Mémoire sur les Formules du Mouvement circulaire et du Mouvement elliptique libre autour d'un point excentrique par l'Action d'une Force centrale*, was read by the veteran *savant* himself at the Academy of Turin a short time before his death, namely, on the 6th of January. Among his numerous contributions to science may also be cited a mathematical demonstration of the existence of a circumpolar northern ocean. Plana was always accessible to strangers visiting Turin, and was remarkable for his kind and courteous reception of men of science who sought his acquaintance.

Maximilian von Weisse was born October, 1798, at Ladendorf, in Lower Austria, of which town his father was mayor. The family consisted of ten children (five sons and five daughters), Maximilian being the third.

In his tenth year he commenced his studies as a pupil in the Royal Academy at Vienna. He pursued the University course of studies, and took his degree as Doctor of Laws at the end of 1822.

Maximilian Weisse at an early age evinced a great inclination for mathematical and astronomical studies. On the 5th of August, 1823, he was named Assistant in the Royal Observatory of Vienna; and on the 24th of May, 1825, was appointed Professor of Astronomy and Director of the Observatory at Cracow.

In 1826, he married a daughter of a merchant of Nuremberg, residing in Cracow. He applied himself to his scientific pursuits in the University of Cracow with great diligence. Weisse was Dean of the Faculty of Philosophy in the Sessions from 1833 to 1860; and from 1833 to 1847 he was a Member of the Senate of the University.

In May, 1861, Weisse quitted Cracow on account of ill-health, caused by the earnestness with which he had pursued his scientific labours. He received a liberal pension from the Government on his retirement. His malady gradually increased so that he was seldom able to leave his couch, yet he nevertheless continued to occupy himself with astronomical reductions and other scientific matters.

He died at Wels, in Upper Austria, on the 10th October, 1863.

Dr. Weisse's astronomical works are numerous. He laboured at his Catalogue diligently and successfully, and gained an enduring reputation as one of the most distinguished astronomers of his time.

Proceedings of various Observatories.

Royal Observatory, Greenwich.

No important changes, instrumental or otherwise, have been introduced into the Royal Observatory, Greenwich, during the past year.

An agreement has however been entered into between the Astronomer Royal and M. Le Verrier, Director of the Imperial Observatory of Paris, for a distribution of the labour of the Meridional Observations of the Small Planets. The Moon is observed at Greenwich with the transit-circle and altazimuth, on every night when its observation is possible. When the Moon passed the meridian between three and six o'clock in the morning, it was found that the same observer could not conveniently make the evening observations of Small Planets, and stars, and also those of the Moon and Moon culminators. At this part of the lunation, therefore, three observers were employed on the same day, and this, with reliefs on alternate days, pressed heavily on the observing staff of the Observatory. To diminish this pressure M. Le Verrier has undertaken the Meridional Observations of the Small Planets, from Full Moon to New Moon; Greenwich being answerable for their observation from New Moon to Full Moon. Captain Gilliss, the Director of the National Observatory, Washington, has also promised to co-operate in the Meridional Observations of the Small Planets.

The three Observatories of Greenwich, Paris, and Washington, will be able to obtain a sufficient number of meridional observations of all the known asteroids, within the reach of their meridian telescopes, if sufficiently accurate ephemerides shall be forwarded to them. Several Asteroids, in opposition during the past year, were not observed at Greenwich, solely for the want of sufficiently accurate ephemerides, and unless some efforts are made in this direction several of the asteroids will be lost.

The volume of *Astronomical Observations for* 1862 is printed, with the exception of the Introduction.

The observations of stars made from 1854 to 1860 inclusive, have been formed into a Seven-Year Catalogue. This Catalogue contains the places of 2022 stars, for each of which

precessions, secular accelerations, and star-constants have been computed afresh. The work is printed, and it is hoped that it will shortly be ready for distribution. This Catalogue comprises about 400 stars contained in Bessel's *Fundamenta*, but not contained in the Greenwich Twelve or Six Year Catalogues, Bradley's places have been brought up by Mr. Stone to the epoch 1860 of the new Catalogue, and the resulting Proper Motions have been laid before this Society.

The application of the Astronomer Royal's method of determining the Motion of the Solar System in Space to 1167 stars, commenced several years ago at the Royal Observatory, has been brought to a conclusion. The result has been laid before the Society by Mr. Dunkin, and will be found printed in the *Memoirs*.

The Equatoreal observations of *Mars*, east and west of the meridian, made during the opposition of 1862 for the determination of the Solar Parallax, have been discussed; the number of corresponding observations is small, and most of these were made under unfavourable atmospheric circumstances; the result is of little weight, but, as far as it goes, it tends to confirm the results lately obtained from declination observations of *Mars*.

The declination observations of *Mars*, and stars made during the same opposition, have been compared with the corresponding observations at the Cape of Good Hope and Williamstown. The separate results are confirmatory of each other.

The great Equatoreal has been employed during the past year in observations of the fixed lines of the stellar spectra. The general results have been laid before the Society. Since the observations printed in the *Monthly Notices* were made, the prism-apparatus has been provisionally altered, so that, instead of producing astigmatic breadth of the spectrum, by the unequal refractions of a conical pencil at the two sides of the prism, a pencil of rays made parallel by a lens traverses the prism, and after being made convergent by a second lens is made astigmatic by a cylindrical lens. The definition of lines appears to be improved, and the facility of measuring them increased. The Equatoreal has also been used in observations of the Nebula of *Orion*, a drawing of which is to be made by Mr. Carpenter, and in a few observations of the solar disk with a Hodgson's eyepiece.

On the evening of January 11th the Nebula of *Orion* was splendidly seen. It was the opinion of the observers, Messrs. Stone and Carpenter, that the portions about the so-called jaws were not so accurately represented in the late drawing by Professor G. P. Bond as in that of Sir J. Herschel, printed in the *Results of the Cape Observations*, 1847. There is a squareness of outline about the so-called jaws, and an almost total absence of luminosity within them, in the drawing of Professor

Bond, that certainly was not presented by the Nebula on this evening. The drawing of Sir J. Herschel appeared to represent as accurately as perhaps any drawing could, the appearances presented about the jaws; the only marked deviation being that the wisp of luminous matter, 10^s following and 300 divisions north in Sir John Herschel's drawing, appeared to point more towards the trapezium than there represented. The other parts of the Nebula have not yet been examined with the same care as the portions about the jaws.

The galvanic connexions of the Observatory have been still further extended during the past year. Currents from the Observatory now fire time-guns at Newcastle and Shields; and the Westminster Clock sends daily indications to Greenwich, by which its error is always known at Greenwich; currents in the opposite direction being sent from Greenwich, which enable the attendant to adjust the Westminster Clock to accuracy.

In order to get rid of the disturbing effects of changes of temperature on the magnetic instruments, the Astronomer Royal has determined to excavate a room underneath the present magnetic observatory, sufficiently large to contain the whole of the self-registering magnets. The work has been commenced. The apparatus for the photographic registration of earth-currents is nearly finished, and will shortly be ready for use.

The proposal for carrying a Railway through Greenwich Park was renewed in the last session of Parliament. The scheme was however withdrawn.

A new construction of heads of micrometers has been introduced in the Transit circle of the Royal Observatory, the milled heads being made conical, so that the pressure of the observer's fingers will inevitably force the micrometer's screw to its bearing. It is believed that the adoption of this construction may tend to remove every suspicion of imperfect bearing of the screw.

Royal Observatory, Edinburgh.

Meridian observations of stars, time-signalling, and Government meteorological calculations, have been the main work of the Royal Observatory, Edinburgh, during the past year. Besides this, the twelfth volume of printed *Astronomical Observations* has appeared, and the Astronomer thankfully records the assistance afforded by the Royal Astronomical Society in distributing many of the copies. An addition, of an unusual character, made to the volume is worthy of notice, viz., four plates, photographic, and one, photoglyphic; the latter specially prepared for the occasion by Mr. Fox Talbot, the venerable inventor both of photography and photoglyphy. The scientific reason for the introduction of these plates, which are highly

magnified portions of some of the Teneriffe photographs of 1856, is the remarkable testimony which they bear to the transparency of the atmosphere and its suitability to telescopic observation at great heights above the sea-level.

In the department of time-signalling, some important extensions have been made during the past year, almost involuntarily on the part of the Observatory, but strictly in accordance with the original instructions to the Astronomer Royal for Scotland. Of the three methods which are practised in the Observatory,—viz., by electric-controlled clocks (R. L. Jones's patent), and of which there are now no less than six; electric-dropped time-ball; and electric-fired time-gun,—the first and the third seem to be most in public demand. The Edinburgh time-gun, at a distance of 4000 feet from the Observatory, is fired by a special application of electricity, which, though apparently the very best that could be contrived for that case, does not suit very much greater distances, as it implies the continued and permanent use of a wire connecting the stations. Hence it occurred to Mr. N. J. Holmes, Telegraphic Engineer, in the course of the last spring, to elaborate a method, based on the use of Professor Wheatstone's magneto-exploder and Mr. Abel's magnetic fuse; and having obtained promise of assistance from the Royal Observatory, Edinburgh, the experiments went rapidly forward. The first point was, to ascertain the trustable amount of exploding power available in this manner along the ordinary open lines of telegraphic wire. Accordingly, with the further help and countenance of the Electric and International Telegraphic Company, a previously arranged series of currents was sent off from the magneto-exploder (in external appearance merely a box of about 8 inches cube) in Edinburgh, to the Company's Office in Newcastle, a distance of 120 miles; and the result in the times and intervals, as tested by a chronometer belonging to Messrs. Reid, of that city, showed no sensible hesitation or hang fire.

This notable experiment settled the great power of Wheatstone's exploder in overcoming the resistance of a very long wire when its insulation was good; but when that was bad, as happened only the following day, by reason of a heavy fog, the high intensity of the magnetic currents caused their loss and dissipation before reaching Newcastle. Hence a practical system was soon devised, by which a large signal-sending clock, recently prepared for the Royal Observatory, Edinburgh, by Messrs. Ritchie and Sons, clockmakers there, despatched along the line a current of galvanic electricity of low intensity; and this, on reaching Newcastle, automatically liberated there a current of *magnetic* electricity, which had then only a few hundred yards to travel, through a covered wire, to the place where the time-gun was placed.

Professor Smyth, with the aid of local subscriptions, ex-

tended his experiments to other cities in England and Scotland; altogether, no less than seven different "distant" time-gun signals have been successively — though they are not all at the present moment — fired, directly from the Royal Observatory, Edinburgh, and day by day further inquiries are being made from other quarters, and five more cities are already in pretty active preparation; while Government, with a truly liberal discernment, has looked on the system so favourably as to lend guns, 24-pounders, to nearly every city that has fully subscribed amongst its citizens for the expense of powder and maintenance.

The Royal Observatory, Edinburgh, has been consequently obliged to enlarge its galvanic batteries and telegraphic connexions, and has drawn up a set of rules and a system of supervision, including a weekly schedule report, for any distant time-gun, where Edinburgh currents are expected. By strictly insisting on these rules, those cities in connexion with the Edinburgh Observatory will have the satisfaction of knowing, that, however distant they may be from Edinburgh, their time-signals are fully as prompt and exact, even to a very small fraction of a second, as if they had a Royal Observatory within a few feet of them.

Radcliffe Observatory.

No change whatever has occurred in the operations of the Radcliffe Observatory since the publication of the last Annual Report. The staff of Assistants remains the same, and the subjects of observation are essentially the same as they were in the preceding year.

The Carrington Transit-circle has been used without intermission in the continuation of the observation of the stars of this hemisphere lying between the fifth and seventh magnitudes, and in observations of the Sun, the Moon till past opposition, and some of the planets. Mr. Main is still well satisfied with its performance; and, as stars north and south of the zenith are ordinarily observed by reflexion and direct vision, in the same manner as at Greenwich, and the errors of collimation and level are observed every evening with indisputable accuracy in the same way, there is every guarantee for the goodness of the results, so far as this depends on the instrument. The graduations of the circle were examined in January 1863, by means of several series of readings with the eight microscopes, at intervals of 5°, and the result is very satisfactory, as showing that the errors are very small.

A great many occultations of stars have been observed, and the times of beginning and end of the solar eclipse of May 17, 1863. All these instances, amounting to nearly twenty in

number, have been rigorously discussed by Mr. Main, by a peculiar method which he believes to offer great facilities for the calculation of this class of phenomena, and the results all show that the errors of the Moon's places throughout the year, as given by Hansen's Lunar Tables, are very small.

With the heliometer, observations of double stars have been rigorously continued, and the number of stars observed (additional to those of preceding years) is about 190. The stars chosen for observation in 1863 were chiefly the *Lucidæ* of Struve, of the whole of which the re-observation at the present time seems desirable. The components of these systems are, it may be remembered, of nearly equal magnitudes, varying from about the sixth to the ninth; and Struve concluded that there was very great probability that the larger number, if not the whole of them, were physically and not optically connected. The results of the Oxford observations thus far do not confirm this idea, as, in the interval of more than thirty years which have elapsed since Struve's observations, very few of them exhibit any considerable motions in distance or position-angle. Mr. Main proposes to complete the re-observation of the whole of them, and the discussion of the results cannot fail to be interesting at the conclusion of his labours. Almost all the double stars in Smyth's *Cycle*, which it seemed desirable to re-observe, have had proper attention paid to them.

In the autumn of 1863, new machinery for opening and closing the shutters of the dome of the heliometer was supplied by Mr. Grimsley, of Oxford, and the shutters will now fall back far enough to allow of the instrument being used equally well in all positions. The time occupied in making this alteration was nearly three months; and, of course, during this interval the instrument was out of use.

The photographic meteorology has been kept up with the same vigour as in former years, under the charge of Mr. Lucas. During the heavy gales which occurred in October and December, an interchange of copies of the photographs giving the meteorological elements was made between Greenwich, Oxford, and Kew; and the comparison of the critical points of the storms was found to be very instructive and interesting.

The twenty-first volume of the *Radcliffe Observations*, containing the observations of the year 1861, has recently been published; and the Council are glad to draw attention to this volume, not only for the value of its contents, but also because it tends to show that the practice, for so many years adhered to by Mr. Johnson, of reducing the observations and publishing the results as soon as possible after the close of any year, is still kept up by the present Director. When it is considered that, in the space of very little more than three

years, the results of the observations of four years, together with the Radcliffe Catalogue of Stars, have been given to the world, and that the reductions for 1862 are in a very forward state, there appears to be little doubt that the existing establishment will still be able to make the reduction keep pace with the observations, and that early publication will still continue to be one of the characteristics of the Radcliffe Observatory.

The reductions for 1862, as before stated, are in a very forward state, but those of the meridian observations for 1863 have not been commenced yet. Indeed, the Director is conscious that his own energies, as well as those of the Assistants, have been taxed to the utmost in the production of the amount of work which has been reported within the last two years, and that probably a diminution of some of the heaviest portions may become necessary, keeping in mind the necessity of making the reductions keep pace with the observations, and of publishing a volume annually. He is also not unmindful of the importance of commencing, without further delay, the compilation of the second *Radcliffe Catalogue of Stars*, which will include all the stars observed with the transit-instrument and the meridian-circle, from the year 1854 to 1861 (both inclusive).

At all events, the works which are now in progress will prevent any anxiety, for some years to come, about the activity and usefulness of this Observatory.

Cambridge Observatory.

The meridian observations made at this Observatory during the past year comprise observations of the Sun near the equinoxes and solstices; observations of the planets *Jupiter*, *Uranus*, and *Neptune;* observations of stars which were compared with comets in the years 1861, 1862, and 1863, and also of stars selected from Oeltzen's comparison of Lalande's *Histoire Céleste* with Argelander's *Northern Zones*, for the purpose of testing all the more considerable proper motions thus found by M. Oeltzen. With the equatoreal have been made observations of Comets II., III., and IV., 1863, and a few observations of occultations of fixed stars by the Moon, and of eclipses and other phenomena of *Jupiter's* satellites.

The work of the Observatory during the past year has been seriously crippled by the loss of the First Assistant. Mr. Bowden left in January, 1863, in order to enter upon an occupation wholly unconnected with astronomy. Some difficulty has been found in supplying his place, as Prof. Adams was anxious to secure the services of an Assistant who had already had experience in observatory work, and it was hardly to be expected that this could be done without a considerable

augmentation of the stipend usually paid. This difficulty, however, has just been removed by a grant from the Sheepshanks Fund; and Prof. Adams has been fortunate enough to secure the assistance of Mr. A. Graham, whose labours at the late Mr. Cooper's Observatory, at Markree, have made his name so well known to the astronomical world. Under these circumstances it may be confidently anticipated that this Observatory is about to enter upon a period of renewed and increased activity.

Some alterations have been made at the eye-end of the Northumberland Telescope, in order to render it possible to use eye-pieces giving a larger field of view; and a small position-circle has been applied to the finder, so as to give the means of measuring approximately angles of position, such as that of the tail of a comet which could not be observed in the large instrument.

The Jones Equatoreal has been put into working order by Mr. Simms; and the Graham Clock, which is used with this instrument, has been thoroughly restored by Mr. Frodsham.

The printing of Vol. XX., containing the Meridian Observations to the end of 1860, is now complete, with the exception of the Introduction, which Professor Challis is preparing for the press.

Liverpool Observatory.

The site on which the Liverpool Observatory now stands will shortly be required for dock accommodation, and it will be necessary either to remove the building some two or three hundred feet to the south of its present position, or to find a more eligible site.

Equatoreal observations have been taken of Comets II., V., and VI., 1863, but they have not yet been reduced. The new self-registering barometer has been in operation since June last: the sheets on which the record is obtained are removed from the cylinder every morning at 9 A.M., and a tracing from the original for the previous twenty-four hours is forwarded daily, at 10 A.M., to the Underwriters' Rooms, together with an account of the force and direction of the wind, the fall of rain, &c. A meteorological record is also forwarded regularly to the Mersey Docks and Harbour Board.

It was stated last year that considerable alterations had been made in the method of giving the errors and rates of chronometers; and, although the docks in the immediate neighbourhood of the Observatory have for some months past been closed to sea-going vessels, the increase in the number of ships' chronometers sent to be rated has been considerable. This Mr. Hartnup attributes to the new method of giving the errors

and rates being more highly appreciated. During the winter months each chronometer is exposed for a week to the temperatures 50°, 65°, and 80° alternately; and for whatever time the chronometer may be at the Observatory the error is given at the end of each seven days, together with the mean rate and extreme difference of rate between any two days for each week. The latter, Mr. Hartnup thinks, shows the quality of a chronometer better than any other method that he has been able to devise. The system of clock-controlling, and the method of communicating time to the port generally, as mentioned in former notices, continues to give great satisfaction.

Glasgow Observatory.

Since the installation of the Ochtertyre Equatoreal at the Glasgow Observatory, the attention of Professor Grant has been chiefly occupied with the negotiation of arrangements for the transmission of true time from the Observatory to the City and Port of Glasgow, and the shipping of the Clyde in general. An electric wire has recently been laid down, connecting the Observatory with the University buildings; and two clocks—one the turret-clock of the College, the other a small clock in Professor Thomson's Class-room—have been placed under the control of the mean-time clock of the Observatory by the application of Jones's well-known method. The result, in both cases, has been completely successful. The Town Council have commenced operations with one of the City clocks, for the purpose of similarly placing it under the control of the Observatory clock; and there is every probability, at present, of Jones's invention acquiring, ere long, an extensive application in Glasgow and the neighbouring towns, in connexion with the Observatory of the Glasgow University. It is intended by Professor Grant that the fine Equatoreal, which has been mounted at the Observatory, shall be devoted chiefly to measures of Double Stars and differential observations of the Minor Planets. A micrometer has been recently obtained from Mr. Simms, with a view to the prosecution of the last-mentioned object; and a course of observations has been commenced with it.

Mr. De La Rue's Observatory.

During the first three months of last year several very beautiful and interesting lunar photographs were taken; but in April the 13-inch silvered glass mirror, together with a silvered glass plane mirror, were received from Dr. Steinheil, of Munich, and the photographic records were discontinued in order to test the new mirrors.

The experiments, however, in enlarging the negatives to

the dimensions of Beer and Mädler's map (38 inches), which were commenced in 1862, have been continued in 1863, and results obtained far surpassing those previously recorded.

Hitherto the silvered glass mirror has not been used for astronomical photography, but it is contemplated to test its powers for that purpose as early as possible. The light reflected by the silvered glass mirrors is found to be considerably greater than that of the speculum-metal mirrors, and there is reason to believe that the time of exposure of the sensitive plate will be shortened. Up to the present time the mirrors have retained their original polish, the precaution having been taken to insert lime-boxes in the tube of the telescope, to prevent the mirrors from becoming damp.

As far as Mr. De La Rue has been able to judge, he does not believe Dr. Steinheil's mirror to be so perfect in figure as those surfaces he has been able to procure by means of the polishing machine described in the *Monthly Notices*.*

In February, 1863, Mr. Reynolds' engagement terminated, and he left Cranford; the Kew heliograph was then removed to the Kew Observatory, and re-erected in the dome of that establishment. Mr. Balfour Stewart, the Director, reports that it has been in regular operation at Kew since the middle of May last, Mr. De La Rue having undertaken to superintend the working of this instrument, with the aid of Mr. Bickley, of Kew, and a qualified photographic assistant. Up to the end of last year, 104 negatives, capable of being printed from, had been obtained, and of all these the definition is unexceptionable. The following list may be of interest to those who are engaged in procuring solar autographs: it comprises the dates of the pictures taken at Kew since the instrument was last mounted:—

Dates of Sun-Pictures taken at the Kew Observatory in 1863.

May 24th, 25th, 26th, 27th, 28th, 29th.

June 1st, 2d, 3d, 4th, 6th, 8th, 9th, 10th, 11th, 13th, 19th, 20th, 23d, 25th, 26th, 27th, 29th, 30th.

July 1st, 2d, 3d, 4th, 5th, 6th, 7th, 9th, 10th, 12th, 14th, 15th, 17th, 18th, 19th, 24th, 26th, 28th, 29th, 30th, 31st.

August 1st, 5th, 7th, 8th, 10th, 11th, 12th, 22d, 24th, 28th.

Sept. 1st, 7th, 10th, 11th, 16th, 17th, 18th, 19th, 22d, 23d, 24th, 25th, 26th, 28th, 29th, 30th.

October 1st, 5th, 6th, 13th, 14th, 16th, 17th, 22d, 23d, 31st.

November 2d, 6th, 9th, 12th, 13th, 19th, 20th, 21st, 22d, 23d, 28th.

December 3d, 4th, 10th, 12th, 14th, 16th, 18th, 19th, 22d, 23d, 25th, 30th.

In all 104 Pictures.

* Vol. xiii. p. 44.

The photographs of the Sun's disk, obtained at Cranford from Feb. 7, 1862, to Feb. 7, 1863, amounted to 213. With the kind permission of Mr. Carrington, Mr. De La Rue engaged the services of Dr. von Bose to measure these photographs, and to reduce the measurements to heliocentric positions of latitude and longitude. The measurements were made by means of Mr. De La Rue's micrometer, described in the *Philosophical Transactions*, vol. 152, pp 373–375.

With the exception of six of the photographs, which were too faint to be adjusted, all the disks have been measured, so that measurements of 207 pictures, obtained in 161 days, have been completed. Whenever there was only one photograph for a day, this has been adjusted and measured twice through, and 1880 positions of Sun-spots have been obtained.

The measurements and sketches of the spots have been entered into ruled sheets, and again checked with the originals.

The reductions of the 1880 positions (according to Mr. Carrington's methods) are finished, but there is a good deal of checking to go through. The resulting positions have been put together on separate sheets, but will also require to be gone through before they are ready for publication.

The series of photographs form a continuation of the observations recently placed before the scientific world, by the publication of Mr. Carrington's valuable work, and it is to be hoped that the photographic observations and reductions will not be allowed to drop now that it has been demonstrated that they afford accurate numerical results.

Ely Observatory.

The "Heliautograph" of the Rev. W. Selwyn, consisting of a photographic camera, attached to a Dollond refractor of $2\frac{3}{4}$-inches aperture, has been in operation at Ely from the 1st Jan. 1863; the Royal Society having made a grant of 50*l.* to enable Mr. Titterton to devote himself to the work of obtaining a regular series of solar autographs.

The number of days from Jan. 1, 1863, to Dec. 31, 1863, is 139, on 55 of which two negatives were taken—the second after a short interval of time—with the view of ascertaining the true character of any doubtful spot.

In this series there is no such long and close succession of disks as was obtained between July 25 and Aug. 4, 1862, when a very large spot, with its train, was exhibited on eight days of its passage from the eastern to the western limb, as seen in the frame which hangs in the Society's room; but there are two interesting records of the solar eclipse of May 17, 1863, one near the beginning, $5^h\,46^m\,35^s$ G.M.T., the second near the middle, $6^h\,20^m\,10^s$ G.M T.

The latter, being taken in a clear sky, shows very distinctly the uneven edge of the Moon on the solar disk, and the appearance (so often noticed, and now, it is believed, generally recognised as an optical effect) of a bright band surrounding the edge of the Moon.

The images of the solar disk are about 4 inches in diameter, and the whole series, placed in frames to allow of easy comparison by the eye, will be exhibited to the Society before they are presented to the Royal Society in acknowledgment of their grant.

It has not yet been found practicable to add to these autographs the lines of position for Right Ascension and Declination, as in the Kew instrument; but it is hoped that, while the Kew pictures serve the purpose of ascertaining the exact positions and measuring the proper motions of the spots, the Ely autographs will have some value, as recording the physical phenomena of the formation, the changes, and the dying away of spots; and it may be observed, in particular, that the *faculæ*, so intimately connected with the spots, are here well seen.

The Kew and Ely series will supplement each other on several days of 1863, and copies for those days are to be transmitted from the one to the other. The whole number of Solar disks recorded in the two series is 188.

During the past year, Mr. Titterton has also given much of his time to the getting into working order a larger refractor, of 6 inches aperture, with camera attached. After many trials and difficulties, he has succeeded in obtaining the chemical focus, and hopes soon to show solar autographs of 6 inches diameter. It is intended to use this instrument for the delineation of spots and groups, when near either limb, bringing that portion of the disk as near as possible to the centre of the photographic plate. This instrument is so made that autographs can be taken either with or without the lines of position.

The Progress of Astronomy during the past Year.

The past year, if not remarkable for salient astronomical discovery, can scarcely fail to be memorable for the activity displayed in the many contributions which during its course have been made towards the perfection of astronomical accuracy. The most important elements of our cosmical system are better known to us at its close than they were at its beginning; we have profited largely by the stores of knowledge treasured up for us by the labours and genius of astronomers, whose day of toil has long since closed; and we are every year becoming more sensible of the intimate relation

in which every branch of natural science stands to our own favourite pursuit, the chief of them all.

The correction made to the Sun's Parallax may justly claim the foremost place in the annals of our astronomical year. The received value of this element, 8″·56, adopted by Encke from questionable observations of the last transit of *Venus* in 1769, has always been accepted by astronomers as simply provisional; and, in the apparent absence of more available means, they have been patiently waiting until improved methods and better instruments could be applied to the next occurrence of the same phenomena in 1874 and 1882. Meanwhile this very correction, thus patiently waited for, had been shown by Le Verrier to be all along, by implication, contained in the comparison between the theoretical and observed motions of *Mars*, *Venus*, and the Moon; and the improved value thus suggested by theoretical considerations was adopted in his Solar Tables. Before him, Hansen had in the year 1854 announced that the parallactic inequality in the lunar theory indicated the necessity of increasing the solar parallax. Subsequently to Hansen and Le Verrier, M. Leon Foucault has succeeded in determining the velocity of light by certain mechanical arrangements of considerable simplicity and easy repetition, and combining his result with the well-ascertained coefficient of aberration he has deduced a value of the solar parallax in satisfactory accordance with the amount assumed by Le Verrier. Mr. Stone, on comparing the observations of *Mars* at his recent opposition, made at Greenwich with similar observations made at Williamstown, Australia, has deduced a result for the solar parallax possessing a remarkable coincidence with those obtained by the other astronomers from theoretical considerations. Le Verrier's value is 8″·95; Hansen's 8″·9159; Stone's, as deduced from *Mars* at opposition, 8″·932 ± 0″·032. (*Monthly Notices*, April and June, 1863.)

M. Winnecke, from a comparison of the Pulkova and Cape of Good Hope Observations of *Mars*, obtained the value 8″·964 (*Ast. Nach.* 1409).

This minute correction, amounting to no more than two-fifths of a second of arc, thus curiously brought to light in the first instance by small disturbances in the motion of the Moon and planets, may reasonably inspire astronomers with additional confidence (if that were needed) in the exactness of their science and in the fixedness of the laws which bind the Kosmos together. And if, on the other hand, a contrary misgiving is created in other minds from the fact that this abrupt alteration of so important an element as the solar parallax implies an alteration of some four millions of miles in the Sun's reputed distance from our Earth, this misgiving may perhaps be removed by the consideration that, after all, this improvement of our knowledge amounts to no more than a correction to an observed angle

represented by the apparent breadth of a human hair viewed at the distance of about 125 feet.

Coincident in time with our improved knowledge in the distance of the Sun, comes curiously enough that of the Moon also. Mr. Breen, in the volume of our *Memoirs* for the present year, has compared observations of the Moon's zenith distance, made at the Cape of Good Hope during the years 1834, 1836, and 1837, with similar contemporaneous observations made in Europe. The result is, that Mr. Adams's constant of Lunar Parallax, viz. $3422''{\cdot}32$, requires a correction of $+\ 0''{\cdot}38$, and therefore becomes $3422''{\cdot}70$. This latter constant is adopted in the *Nautical Almanack* for 1867; and, it may be observed in passing, implies a diminution of our mean distance from the Moon of about 26 miles. It is no more than what is due to Professor Adams, to quote from his Memoir in our *Monthly Notices* for April 1853, the following clause, as if in anticipation of this improvement upon his own labours; "Mr. Maclear's observations," he says, "at the Cape, combined with European observations, would doubtless furnish most valuable materials for a new determination of the constant of parallax." To this remark it may be added, that a still closer approximation to the truth is to be expected from observations made with the noble transit circle, which has happily displaced Jones's mural circle at the Cape.

Astronomers will regard with especial interest the Astronomer Royal's renewed attempt to determine the magnitude and direction of the motion of the Solar System in Space. Sir W. Herschel in 1783, by a graphical method of great simplicity, showed that the proper motions of a few stars might be tolerably well accounted for, by assigning to the Sun a motion of his own directed towards λ *Herculis*. Other astronomers, starting with this as an approximate apex of solar motion, have sought to correct it by combining together a far greater number of stars than could be taken into account by the elder Herschel. The Astronomer Royal, by the independent method of referring all the motions to three rectangular co-ordinates, as applied to 1167 stars, falls again very nearly upon Sir W. Herschel's original position of the solar apex. And yet, strange to say, notwithstanding the near coincidence of all the results of the before-mentioned independent methods of investigation, the inevitable logical inference deduced by Mr. Airy is, that the whole question of solar motion in space, so far at least as accounting for the Proper Motion of the stars is concerned, appears to remain at this moment in doubt and abeyance. A comparison of Sir W. Herschel's exquisitely simple memoir in the *Philosophical Transactions* for 1783, with the Astronomer Royal's elaborate investigation, as exhibited by Mr. Dunkin in the present volume of our *Memoirs*, will be found replete with interest and instruction in this grand cosmical problem.

In no remote connexion with the foregoing question we may record Goldschmidt's discovery of one or more companions to *Sirius*. Last year we had occasion to remark that Bessel's hypothesis of non-luminous or hitherto invisible companions to *Sirius* and *Procyon*, had been shown by Auwers and Safford satisfactorily to explain certain peculiarities in the Proper Motion of these stars, both in Right Ascension and in Declination. During the present year it is very remarkable that M. Goldschmidt should not only have confirmed Alvan Clark's discovery of a companion to *Sirius*, but observed also several others, and of these at least one has been verified by Mr. Dawes. (*Monthly Notices*, March and April 1863.) It is possible that one or more of these optically minute bodies may satisfy the conditions required. Whether this be so or not, the comparative insignificance of the instrumental means at the disposal of M. Goldschmidt, at once reflects honour upon that astronomer's zeal and sagacity, and affords peculiar encouragement to future observers unprovided with the costly luxuries of modern instruments. M. Goldschmidt's labours remind us of the slender appliances which in Dalton's hands were made to evolve some of the most memorable of chemical discoveries.

Nor have we yet done with the labours of the past year bearing at least some distant relation to the great cosmical question of the solar motion. Among the several tantalizing lacunæ in our knowledge which beset the investigation of this interesting subject, are especially two, viz., our ignorance of the Parallax of the stars, and especially our want of accurate knowledge of the Proper Motions of those in the Southern Hemisphere. There is now a hope that we see at least the commencement of an attempt to fill up both these lacunæ. On the one hand, M. Krüger (*Monthly Notices*, March 1863) has added two or three to the very limited list of stars whose parallax is approximately known. (*Monthly Notices* for March 1863.) On the other hand, we have reason to hope that the Council of our Society may be successful in rendering what assistance they can to the astronomers at the Cape, at Williamstown, and Madras, in the formation of a Catalogue of Stars in the Southern Hemisphere, similar to the one which Argelander has so ably completed for the north.

The cause of the well-known discordance between the zenith distances of celestial objects obtained by direct observation and those obtained by reflexion from quicksilver, was some time since suggested by M. Faye. The question, however, has this year been set to rest by the Astronomer Royal, who has successfully traced the cause to the meteorological condition of the air surrounding the instrument, as influenced by the dimensions of the shutters in the observing-room. The general conclusion drawn from the investigation has an important bearing on the accuracy of all instrumental determina-

tions of zenith distances, inasmuch as Mr. Airy has shown that all such determinations deduced from direct observation uncombined with reflexional observations are liable to an appreciable error, varying from a quarter to half a second. (*Monthly Notices*, June 1863.)

Correlative, and yet in a measure antithetical, to the foregoing effect of meteorological elements on the required accuracy of results, is the influence of surrounding *geological* conditions on the direction of gravity. The effect of mountainous tracts on the deviation of the plumb-line from the vertical has long since been ascertained; but it has been reserved for Professor Schweizer, of Moscow, to detect an error amounting to nearly 8″ in the direction for gravity, evidently caused by the lithological characteristics of a district not only totally free from mountains, but even presenting a very level contour.

It is, to say the least of it, a curious circumstance that astronomical results should be available for the detection of small relative *deficiencies* of matter, unsuspected by the eye, and extending over but a very few miles of the Earth's surface. (*Monthly Notices*, April 1863.)

No advance has this year been made towards the reconciliation of Professor Adams's value of the Acceleration of the Moon's mean motion with Hansen's value, which represents ancient eclipses so well; but Hansen himself has suggested that the hypothesis of the infinitesimal alteration of the time of the Earth's rotation by ·01197 seconds in 2000 years may possibly account for the discrepancy, and may also explain certain anomalies between the theoretical and observed places of *Mercury* brought to light by M. Le Verrier. (*Monthly Notices*, May 1863.)

The publication of the results of Mr. Carrington's scrupulously accurate and persevering labours on the Solar Spots will at all times be memorable in the annals of the physical history of the Sun. The methods adopted for reducing and tabulating the observations of the spots in their various phases deserve to be a model for future efforts. The influence which the varying distance of *Jupiter* may have upon these outbursts of solar activity, and the reactions which these in their turn may have upon the meteorological conditions of our own atmosphere; the apparent alternate expansion and contraction of the limiting parallels between which the spots are formed, and the curious drift in the strata of the photosphere which contain them, are among the interesting questions more or less briefly referred to in the volume before us, and the determination of which is necessary to the elucidation of Mr. Carrington's question, "What is a Sun?" It is the high reward of conscientious and well-directed researches such as these, that their results, far from being exhausted in the day of their completion, contain the germs of future and successive discoveries beyond the con-

templation of the original labourer. ("Observations on the Spots of the Sun," R. C. Carrington, 1863.)

In connexion with these phenomena in the solar envelopes we may refer to the discussions which have taken place at the meetings of our Society, and to two papers by Mr. Dawes in our *Monthly Notices* for December and January, relative to the telescopic appearance of the solar photosphere. A question has arisen whether the general appearance of the photosphere is that of a flocculent precipitate, as suggested by Sir John Herschel, and assented to by Mr. Dawes, or whether it more nearly resembles a willow-leaved crystalline precipitate of detached particles,* as originally described by Mr. Nasmyth, and confirmed by Mr. De La Rue and the writer of these pages. The question is remarkable, and worthy of the attention of observers possessing adequate optical means, not only on account of its important physical bearings, but as showing the extreme difficulty of a determination on which observers so eminent are found to differ.

Mr. Howlett has perseveringly continued his systematic observations of the physical features of Sun-spots, and, although possessing comparatively small instrumental power, has vied successfully with other observers in producing a series of Sun-records of great scientific value.

It would be disloyal to our Society were we to conclude this *resumé* of the astronomical labours of the past year without an allusion to the admirable work on Astronomy, recently published by one of the former Presidents. It is nothing more than an act of simple justice to the merits of Mr. Main's volume to say that it is the first successful attempt in this country to furnish the student, not only with the mathematical deduction of astronomical formulæ, but, at the same time, with the best methods of their practical application in the actual business of an Observatory.

* Particles! from 2″ to 3″ or 4″ long, by about half that breadth; the smallest of them having an area exceeding that of the British Isles. While these pages are passing through the printers' hands we hear of the confirmation of the existence of these strange entities, under convincing circumstances, by Mr. Stone, with the large Greenwich Refractor. To him the Sun's photosphere appeared as if covered with grains of rice. Perhaps, then, these *particles* are not quite so sharp as "willow-leaves" (*Nasmyth*), nor so round as "rice" (*Stone*), nor so long and jagged as "straw" (*Dawes*). Solid bodies, somewhat uniform in size and shape, the immediate origin of the solar light! Comparing great things with small, they remind the chemist of incandescent arsenic emitting light in the combustion of arseniuretted hydrogen.— [C. P.]

Papers read before the Society from February 1863 *to February* 1864.

1863.

Feb. 9. On the Parallax of certain Stars. M. Krüger.

Mar. 13. On the Determination of the Longitude of Valentia, in Ireland, by Galvanic Signals, in the Summer of 1862. (Abstract.) The Astronomer Royal.

On the Fringes of Light observed by M. Poulain, at Goree, during the Eclipse of Dec. 31, 1861. M. Goldschmidt.

On a Mode of Figuring Glass Specula, for the Newtonian Telescope. Rev. H. C. Key.

On the Movement of the Solar System in Space. Mr. Dunkin.

Observations of *Mars*, with Drawings. Mr. Lassell.

On the Visibility of Stars in the *Pleiades* to the unassisted Eye. The Astronomer Royal.

On the Rating of Chronometers. Mr. Hartnup.

On the Parallax of certain Stars. M. Auwers.

On the Movement of the Solar System in Space, deduced from the Proper Motion of 1167 Stars. Mr. Dunkin.

Sur une Equation pour le Calcul des Orbites Planetaires. M. De Gasparis.

On the Madras Observatory. Mr. Pogson.

Occultations observed at Highbury. Mr. Burr.

Apr. 10. On the Appearance of the Dusky Ring of *Saturn*. Mr. Carpenter.

Note on a Small Companion of *Procyon*. Mr. J. G. Barclay.

Observations of Comet I. 1863, &c. M. Romberg.

Determination of the Sun's Mean Horizontal Parallax, from a Comparison of corresponding Observations of N.P.D. of *Mars* and Stars, made at Greenwich and Williamstown during the Opposition of 1862. Mr. Stone.

Occultation of B.A.C. 4006. Capt. Noble.

May 9. Observations of Encke's Comet, at the Royal Observatory, Cape of Good Hope, No. I., from June 3, 1861, to June 23, 1861. Sir T. Maclear.

Ditto ditto No. II., from Dec. 23, 1861, to March 12, 1862. Sir T. Maclear.

Translation of part of Letter to the Astronomer Royal. M. Wolf.

On the Discordance between Reflexional and Direct Observations in Zenith Distance. The Astronomer Royal.

On the Indications by Phenomena of Atmospheres to the Sun, Moon, and Planets. Prof. Challis.

On the Solution of some Problems in Nautical Astronomy. Mr. Hannyngton.

Observation of a Comet (III. 1863). Mr. Petty.

Further Observations upon Solar Spots. Rev. W. Howlett.

Occultations of Stars by the Moon, &c. Mr. Gorton.

Remarkable Phenomena attending the Lunar Occultation of χ *Cancri*. Rev. W. R. Dawes.

Observation of the Lunar Crater *Plato*. Rev. W. R. Dawes.

Observations of Comet II. and III. 1863. Mr. Hodgson.

Note on the Coefficient of Parallactic Equation in the Lunar Theory. Mr. Stone.

On a Portion of the *Mare Imbrium*. Mr. Birt.

Elements of Comets II. and III. 1863. M. Romberg.

Jupiter's Satellites, &c., Are they Visible to the naked Eye? Mr. C. Mason.

Occultation observed at Highbury. Mr. Burr.

On a Solar Eclipse recorded in Ancient Chinese History. Mr. Williams.

Observation of a Solar Facula and Occultation of χ *Cancri*. Capt. Noble.

Observations of the Planet *Mars*. Mr. Lockyer.

Observations of *Astrea* and of the Solar Eclipse of May 17, 1863. Mr. Hartnup.

On the Lunar Eclipse of June 1. Prof. C. P. Smyth.

On the Eclipse of the Moon, June 1, 1863. Mr. H. S. Ellis.

Occultation of $\varkappa$ *Cancri*. Sig. J. Vertu.

On his Apparatus for producing Uniform Motion. M. Foucault.

On the Constant of the Moon's Equatoreal Parallax. Mr. H. Breen.

On the Companions of *Sirius*. M. Goldschmidt.

Nov. 13. Statutes of a new Astronomical Society founded at Heidelburg. M. Zech.

Calculation of the Sun's Parallax from the Lunar Theory. Translated by W. T. Lynn, Esq. M. Hansen.

On the Luminous Band round the Moon during Partial Eclipses of the Sun. The Astronomer Royal.

Inferior Conjunction of *Venus*. Mr. Prince.

Occultation of *κ Cancri*. Mr. Prince.
Notes on 95 *Herculis*. Capt. Huggins.
Note on his Drawings of *Mars*. Mr. Lassell.
Observations of the Sun at Rising and of Solar Spots. Sir A. Lang.
Observations of Comet II. 1862. Sir T. Maclear.
Observations of *η Argus*. Mr. Abbott.
On certain Depressions on the Moon's Western Limb. Rev. H. C. Key.
Results of Meridional Observations of Small Planets. The Astronomer Royal.
Observations of *Venus* near her Inferior Conjunction. Capt. Noble.
On a Stand for a Reflecting Telescope. Rev. H. C. Key.
Errata in his Logarithms. Gen. Shortrede.
Elements and Ephemeris of Comet IV. 1863. M. Romberg.

Dec. 11. Elements of *Leto*. M. Luther.
Remarks on the Telescopic Appearance of the Exterior Envelope of the Sun, &c. Rev. W. R. Dawes.
On the Eclipses recorded in the Ancient Chinese Historical Work, called Chun Tsew. Mr. Williams.
On the Motion of the Solar System in Space. Mr. Stone.

June 12. On the Amount of Light given by the Moon at the greater stage in the excentrically Total Eclipse, 1863, June 1. The Astronomer Royal.
Observations of Minor Planets. The Astronomer Royal.

1864. Ephemeris of Comet V., &c., 1863. M. Romberg.

Jan.-8. Further Remarks on the Telescopic Appearance of the Exterior Envelope of the Sun. Rev. W. R. Dawes.
On the Calculation of the Optical Effect of Atmospheric Refraction. Prof. Challis.
Note on the Variable Nebula in *Taurus*. Mr. Hind.
Proper Motions of 459 Stars, determined from a Comparison between Bradley and the Greenwich Seven-Year Catalogue. Mr. Stone.

List of Public Institutions and of Persons who have contributed to the Society's Library, &c. since the last Anniversary.

Her Majesty's Government.
The Secretary of State for War.
The Postmaster General.
Royal Society of London.
Royal Asiatic Society.
Royal Geographical Society.
Royal Institution.
Royal United Service Institution.
Geological Society.
Linnean Society.
Zoological Society.
Photographic Society.
Society of Arts.
British Meteorological Society.
British Association.
Institute of Actuaries.
British Horological Institute.
Art-Union of London.
Lancashire Historic Society.
Liverpool Mercantile Marine Association.
Literary and Philosophical Society at Manchester.
Royal Society of Edinburgh.
Royal Dublin Society.
Royal Observatory, Edinburgh.
Royal Society, Victoria.
Imperial Observatory, Paris.
Imperial Observatory, Vienna.
Imperial Observatory, Königsberg.
Royal Observatory, Munich.
Royal Observatory, Brussels.
Royal Observatory, Madrid.
Observatory, San Fernando.
Observatory, Bonn.
Observatory, Christiania.
Observatory, Mannheim.
Observatory, George Town College.
L'Académie Impériale des Sciences de l'Institut de France.
Le Dépôt Général de la Marine.
L'Académie Impériale de Dijon.
Royal Academy of Sciences, Berlin.
The Society of Physics, Berlin.

Royal Academy of Sciences, Munich.
Royal Academy of Sciences, Brussels.
Royal Academy of Sciences, Göttingen.
Royal Academy of Sciences, Amsterdam.
Royal Academy of Sciences, Lisbon.
Royal Society, Naples.
Royal Danish Academy.
Imperial Academy, St. Petersburg.
The Society at Altenburgh.
The Royal Saxon Society, Leipsig.
Austrian Board of Marine.
Canadian Institute.
Committee of Harvard College.
Observatory of Harvard College.
American Academy of Arts and Sciences.
American Philosophical Society.
Academy of Natural Sciences, Philadelphia.
United States Naval Observatory.
Smithsonian Institution.
Franklin Institute.
Committee of the American Coast Survey.
Editors of Silliman's Journal.
Editor of the Athenæum.
Editor of the Parthenon.
Editor of the Critic.
Editor of the London Review.
Editor of the Reader.
Editor of the Intellectual Observer.
Editor of the Sculptor's Journal.
Editor of Cosmos.

G. B. Airy, Esq.
M. Auwers.
J. Baxendell, Esq
Dr. Beke.
Messrs. Bell and Daldy.
M. P. Béron.
G. P. Bond, Esq.
W. C. Burder, Esq.
T. W. Burr, Esq.
Dr. Socrate Cadet.
M. Delaunay.
Prof. De Morgan.
S. M. Drach, Esq.
Prof. Encke.
Dr. Francis.
M. le Prof. Gautier.
S. Gorton, Esq.
Lt.-Col. Graham.
Prof. Hansteen.
J. Hartnup, Esq.
Prof. Heis.
J. Herapath, Esq.
Sir J. F. W. Herschel.
G. W. Hough, Esq.
M. Houzeau.
G. Knott, Esq.
Dr. E. Luther.
W. T. Lynn, Esq.
M. E. Mailly.
G. Maughan, Esq.
Rev. R. Main.
M. Mettenius.
M. L'Abbé Moigno.
Dr. Oudemans.
Dr. Peters.
M. Petit.

M. Plana.
Prof. Plantamour.
Prof. Quetelet.
Sig. Santini.
M. Scarpellini.
M. Schiaparelli.
M. Schwabe.
M. Schweizer.
Prof. Secchi.
Messrs. Smith and Beck.
Prof. W. Von Struve.
M. O. Von Struve.
C. Todd, Esq.
M. Villarceau.
Mr. J. Williams.
M. Winnecke.
Dr. Witt.
Dr. R. Wolf.

The Chairman, after the conclusion of the reading of the Report of the Council, rose to offer a few observations to the meeting. He said that he had an announcement to make to them which would probably produce a chill of disappointment in many of the members. The annual bestowal of the Gold Medal of the Society, as the reward of some astronomical work, had become so much a matter of course, that the Address of the President on the occasion was always expected, as one of the most interesting parts of the proceedings at the General Meeting. He (the Chairman) was sorry, on this account, to have to announce to the members that the Council had on this occasion deviated from their ordinary rule, and that the Medal had not been adjudged. It needed scarcely to be mentioned that this determination was not occasioned by any want of meritorious works which deserved such a reward. The Report which had been read would prove the contrary. In fact, so far was it from being the case that any stagnation or diminution of energy had taken place in the prosecution of Astronomy, that the Report of the progress of the science was unusually interesting. Almost every department had made a marked advance. In Sidereal Astronomy, while Krüger had found measurable parallaxes for two or three additional stars, the unwearied Goldschmidt had been successfully engaged on the system of *Sirius*, and had been rewarded with the discovery of some other minute companions. In the Solar System the advances in our knowledge were still more important. The necessity for a considerable augmentation of the Sun's Parallax had been established by so many different investigations, that it scarcely admits of further controversy, and there is little doubt that the correct value is now known within a very few hundreds of a second. The distance of *Mars* had been measured and delineated at the last opposition with an accuracy never before attempted. Mr. De La Rue, far from being content with the admirable results which he has obtained in Celestial Photography, has made additional and successful efforts for its further improvement. And finally,

the surface of the Sun has been the subject of study to various astronomers best fitted, by their intelligence, their sharp-sightedness, and their command of appropriate apparatus, to extend our knowledge of this marvellous body.

But, in the account of the progress of English Astronomy during the past year, it would be unpardonable not to give a prominent place to the publication of Mr. Carrington's book on the Solar Spots. It would be premature to eulogise this admirable production, the merits of which will no doubt at some future time be brought prominently before the Society; but he (the Chairman) could not avoid saying that he recognised in it the same careful elaboration and finish, the same attention to the minutest necessary details of observation and calculation, coupled with the broadest and most sagacious theoretical views, which had rendered the Red Hill Catalogue of Stars a classic amongst similar productions.

It was not, therefore, for lack of works worthy of reward that the Council have, in this instance, intermitted their usual practice; but, more properly it might be said, that they have been induced to do so on account of the very abundance of them; for only a few out of many have been mentioned in this very imperfect survey.

The frequency of discoveries in many branches of research, and the vigour with which these researches are carried on, make it probable that we are on the eve of obtaining still greater results; and the Council consider that they best regard the interests of Astronomy, as well as of the cultivators of the science, by deferring their judgment till the next steps have been gained, when they will be enabled, in the Address from the Chair, to illustrate better some particular point of the progress of the science.

It is hoped, then, that the disappointment naturally attendant on a departure from the usual rule will be allayed when these circumstances are taken into account; while at the same time the carefully drawn-up Report of the progress of Astronomy, which has been read, will be felt to have rendered an address on the Medal less necessary than at some other times.

The Meeting then proceeded to the election of the Officers and Council for the ensuing year, when the following Fellows were elected:—

President:

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